REMARKS

Applicants respectfully request the Examiner's reconsideration of the present application as amended.

Claims 1-32 are pending in the present application.

Claims 1-7, 22-32 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Publication No. 2002/0116186 ("Strauss").

Claims 9-10 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Publication No. 2004/0078197 ("Beerends").

Claims 11-12 and 16-21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Beerends in view of Strauss.

Claim 13 is rejected under 35 U.S.C. §103(a) as being unpatentable over Beerends in view of Strauss and in further view of US Patent No. 6,289,309 ("DeVries").

Claims 14-15 are rejected under 35 U.S.C. §103(a) as being unpatentable over Beerends.

Claims 6 and 17 have been canceled.

Claims 1, 2, 5, 9, 22, 27, and 30 have been amended.

Claim 33 and 34 have been added.

Support for amended claims 1 and 27 is found in claims 6 and 23 as originally filed. Claims 2, 9, and 30 is found in paragraph [0024] in the specification. Claim 5 has been amended to change its dependency. Support for amended claim 22 and new claim 33 is found in paragraph [0026]. Support for new claim 34 is found in claim 6 as originally filed. Applicants submit that no new matter has been added.

Claims 1-32 are rejected under 35 U.S.C. §102 and §103 as being unpatentable over Strauss, Beerends, and DeVries.

It is submitted that Strauss, Beerends, and DeVries do not render claims 1-5, 7-16, 18-22, and 23-33 unpatentable under 35 U.S.C. §102 and §103.

Strauss includes a disclosure of an integrated voice activation detector for detecting whether voice is present. In one embodiment, the integrated voice activation detector includes a semiconductor integrated circuit having at least one signal processing unit to perform voice detection and a storage device to store signal processing instructions for execution by the at least one signal processing unit to: detect whether noise is present to determine whether a noise flag should be set, detect a predetermined number of zero crossings to determine whether a zero crossing flag should be set, detect whether a threshold amount of energy is present to determine whether an energy flag should be set, and detect whether instantaneous energy is present to determine whether an instantaneous energy flag should be set. Utilizing a combination of the noise, zero crossing, energy, and instantaneous energy flags, the integrated voice activation detector determines whether voice is present (see Strauss Abstract).

Beerends includes a disclosure of objective measurement methods and devices for predicting perceptual quality of speech signals degraded in speech processing/transporting systems may have poor prediction results for degraded signals including extremely weak or silent portions. Improvement is achieved by applying a first scaling step in a pre-processing stage with a first scaling factor (S(Y+.DELTA.), which is a function of the reciprocal value of the power of the output signal increased by an adjustment value (.DELTA.), and by a second scaling step with a second scaling factor (S.sup..alpha.(Y+.DELTA.-); S.sup..alpha.i(Y+.DELTA..sub.i), with i=1, 2), which is substantially equal to the first scaling factor raised to an exponent having a adjustment value (.alpha.) between zero and one. The second scaling step may be carried out on

various locations in the device. The adjustment values are adjusted using test signals with well defined subjective quality scores (see Beerends Abstract).

DeVries includes a disclosure of a spectrum-based speech enhancement system estimates and tracks the noise spectrum of a mixed speech and noise signal. The system frames and windows a digitized signal and applies the frames to a fast Fourier transform processor to generate discrete Fourier transformed (DFT) signals representing the speech plus noise signal. The system calculates the power spectrum of each frame. The speech enhancement system employs a leaky integrator that is responsive to identified noise-only components of the signal. The leaky integrator has an adaptive time-constant which compensates for non-stationary environmental noise. In addition, the speech enhancement system identified noise-only intervals by using a technique that monitors the Teager energy of the signal. The transition between noise-only signals and speech plus noise signals is softened by being made non-binary. Once the noise spectrum has been estimated, it is used to generate gain factors that multiply the DFT signals to produce noise-reduced DFT signals. The gain factors are generated based on an audible noise threshold. The method generates audible a priori and a posteriori signal to noise ratio signals and then calculates audible gain signals from these values (see Devries Abstract).

Applicants submit that Strauss, Beerends, and DeVries do not teach or suggest determining a presence of impulsive distortion in the speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein a <u>ZCR value indicates a rate at which a speech signal switches across its mean value in a frame</u>.

The Office Action mailed 9/25/2007 states in part that

> <u>Claims 5 and 6</u>: **Strauss** discloses ... the ZCR value is computed for a frame of the speech data and indicates a rate at which a speech signal switches across its mean value in the frame (p. 15, paragraph [0154]).

(9/25/2007 Office Action, p. 3).

Applicants disagree.

Strauss discloses a term "zero crossing" that is different from that of a "ZCR value" which is claimed in the present application. <u>Strauss describes zero crossing as an event that occurs when a value of a first data sample has a different sign than a second data sample adjacent to it</u>. Strauss provides a flow diagram for a zero crossing detector 1452. At step 1482, the current data sample x[j] is multiplied together with the previous sample x[j-1] which is compared to zero to determine if there is a sign reversal between adjacent samples. If step 1482 determines that there is a sign reversal between adjacent samples, the zero crossing detector jumps to step 1483. At 1483, a running count of zero crossings is incremented by one (see Strauss paragraph [0153] and Figure 14D).

Applicants submit that Strauss's definition of "zero crossing" is different from "a rate at which a speech signal switches across its mean value in a frame". Consider an example where all of the speech signals are positive and have a mean value of 10. In this example, if speech signals exist that have a value greater than and less than 10, the ZCR value for the speech signals may be greater than 0, while the zero crossing value is zero.

Beerends only discloses a method and device for determining the quality of a speech signal. Beerends does not teach or suggest determining a presence of impulsive distortion in the speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein a <u>ZCR value indicates a rate at which a speech signal switches across its mean value in a frame</u>.

DeVries only discloses noise spectrum tracking for speech enhancement. DeVries does not teach or suggest determining a presence of impulsive distortion in the speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein a <u>ZCR value indicates a rate at which a speech signal switches across its mean value in a frame</u>.

In contrast, claim 1, as amended states

> A method for processing speech data, comprising:
> framing the speech data;
> determining a presence of impulsive distortion in the speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein a ZCR value indicates a rate at which a speech signal switches across its mean value in a frame.

(Claim 1, as Amended) (Emphasis Added).

Claims 16, 27, and 34 include similar limitations. Given that claims 2-5, 7-8, and 33 depend from claim 1, claims 18-21 depend from claim 16, and claims 28-32 depend from claim 27, it is likewise submitted that claims 2-5, 7-8, 18-21, and 28-32 are also patentable under 35 U.S.C. §102 and §103 over Strauss, Beerends, and DeVries.

Applicants submit that Strauss, Beerends, and DeVries also do not teach or suggest framing speech data by overlapping frames such that a set of speech data is allocated to more than one frame.

In contrast, Strauss discloses a framer 1450 that produces frames that have a length of 40 samples (5 milliseconds) or 80 samples (10 milliseconds) of pulse code modulated speech (see Strauss paragraph [0146] and Figure 14B). Strauss discloses that in many cases, a single frame of data is generated by one packet of data (see Strauss paragraph [0170]). Clearly, Strauss does not teach or suggest overlapping frames such that a set of speech data is allocated to more than one frame.

Beerends only discloses a method and device for determining the quality of a speech signal. Beerends does not teach or suggest framing speech data by overlapping frames such that a set of speech data is allocated to more than one frame.

DeVries only discloses noise spectrum tracking for speech enhancement. DeVries does not teach or suggest framing speech data by overlapping frames such that a set of speech data is allocated to more than one frame.

In contrast, claim 9, as amended states

> An automated method for processing speech data, comprising:
> framing the speech data by overlapping frames such that a set of speech data is allocated to more than one frame;
> performing speech quality measurement on the speech data; and
> determining a presence of impulsive distortion in the speech data.

(Claim 9, as Amended) (Emphasis Added).

Claims 2 and 30 include similar limitations. Given that claims 10-16, and 18-21 depend from claim 2, it is likewise submitted that claims 10-16, and 18-21 are also patentable under 35 U.S.C. §102 and §103 over Strauss, Beerends, and DeVries.

Applicants submit that Strauss, Beerends, and DeVries also do not teach or suggest determining the presence of impulsive distortion by identifying a high ZCR value and a medium to high RMS value.

The Office Action mailed 9/25/2007 states in part that

> **Strauss** discloses ... (p. 15, paragraph [0154], 'Speech tends to have a high number of zero crossings.' [inversely, noisy or distorted impulses will have a low ZCR.]

(9/25/2007 Office Action, p. 3) (Emphasis Added).

The Office acknowledges that Strauss discloses that a low zero crossing is indicative of noise and "distorted impulses". Applicants submit that Strauss's definition of zero crossing and application of zero crossing is contrary to that of embodiments of the present invention as described in claim 4.

Beerends only discloses a method and device for determining the quality of a speech signal. Beerends does not teach or suggest determining the presence of impulsive distortion by identifying a high ZCR value and a medium to high RMS value.

DeVries only discloses noise spectrum tracking for speech enhancement. DeVries does not teach or suggest determining the presence of impulsive distortion by identifying a high ZCR value and a medium to high RMS value.

In contrast, claim 4 states

> The method of claim 1, wherein determining the presence of impulsive distortion comprises identifying a high ZCR value and a medium to high RMS value.

(Claim 4) (Emphasis Added).

Claims 19, 25, and 29 include similar limitations.

Applicants submit that Strauss, Beerends, and DeVries also do not teach or suggest determining a presence of impulsive distortion in speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein speech signals have low ZCR values.

The Office Action mailed 9/25/2007 states that

> **Strauss** discloses ... (p. 15, paragraph [0154], 'Speech tends to have a high number of zero crossings.' ...

(9/25/2007 Office Action, p. 3) (Emphasis Added).

The Office acknowledges that Strauss discloses that a high number of zero crossings is indicative of speech. Applicants submit that Strauss's definition of zero crossing and application of zero crossing is contrary to that of embodiments of the present invention as described in claim 4.

Beerends only discloses a method and device for determining the quality of a speech signal. Beerends does not teach or suggest determining a presence of impulsive distortion in

speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein speech signals have low ZCR values.

DeVries only discloses noise spectrum tracking for speech enhancement. DeVries does not teach or suggest determining a presence of impulsive distortion in speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein speech signals have low ZCR values.

In contrast, claim 22, as amended, states

> An article of manufacture comprising a machine accessible medium including sequences of instructions, the sequences of instructions including instructions which when executed causes the machine to perform:
> determining a presence of impulsive distortion in speech data from root mean square (RMS) and zero crossing rate (ZCR) values of the speech data, wherein speech signals have low ZCR values

(Claim 22, as Amended) (Emphasis Added).

Claim 33 includes similar limitations.

In view of the arguments set forth herein, it is respectfully submitted that the applicable rejections and have been overcome. Accordingly, it is respectfully submitted that claims 1-5, 7-16, and 18-34 should be found to be in condition for allowance.

The Examiner is invited to telephone Applicant's attorney (217-377-2500) to facilitate prosecution of this application.

If any additional fee is required, please charge Deposit Account No. 50-4238.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 23rd day of January, 2008.

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